Introduction to Computing — Lab

Week 05

Topic

Nested if-else statements, Loop (while, for)

Objective

- To improve the readability by clearly defining different outcomes based on specific conditions.
- To understand complex decision-making by evaluating multiple conditions.
- To reduce code duplication and improve maintainability by using loops for repetitive tasks.
- To provide mechanisms to control the number of iterations **(e.g., for, while, do-while).**

Outcomes

1. Facilitate complex decision-making processes, allowing for detailed evaluations of conditions within iterative structures.
2. Provide a clear and organized way to manage multiple conditions and repetitive tasks, improving code clarity and flow.
3. Enable programs to respond dynamically to varying inputs and states, adjusting behavior based on both conditions and iterations.

Content

The following topics require understanding for this lab session:

1. Nested if else
2. Loops (for)

Details of these topics are given below:

1. Nested if-else

Nested if-else statement allows you to place one if-else statement inside another, enabling the evaluation of multiple conditions in a structured manner. This construct is useful for handling complex decision-making scenarios where the outcome depends on several criteria. The inner if-else executes only if the outer condition is true, allowing for more granular control over the flow of the program. Proper indentation is essential for readability, as it helps to visualize the hierarchy of conditions.

2. Loop

Loop in programming is a control structure that allows for the repeated execution of a block of code as long as a specified condition is met. Loops are essential for automating repetitive tasks and can iterate a fixed number of times or continue until a certain condition becomes false. In C++, common types of loops include:

- **while**
- **do-while**
- **for**

Tasks

Students are required to complete the following tasks in lab timings.

Task 1

Write a C++ program that determines a person's eligibility for a loan based on their credit score and income:

- If the credit score is above 700, check if the income is above $50,000 and print "Eligible for loan".
- If the credit score is between 650 and 700, check if the income is above $40,000 and print "Eligible for loan with higher interest rate".
- If the credit score is below 650, print "Not eligible for loan".
- Additionally, check if the applicant has any existing loans (yes/no) and print "Considered for a review" if they do, regardless of the credit score.

Task 2

Write a C++ that calculates the bonus for employees based on their performance rating range (0-5) and years of service:

- If the performance rating in 3.5-5:
  If years of service are more than 5, print "Bonus: 20% of salary".
  Else, print "Bonus: 15% of salary".
- Else If the performance rating in "2.2 -3.4":
  If years of service are more than 3, print "Bonus: 10% of salary".
  Else, print "Bonus: 5% of salary".
- If the performance rating is "0-2", print "No bonus".

Task 3

Write a C++ program that determines eligibility for a fitness class based on age and fitness level:

For Beginner use **char = 'B",** for Intermediate use **char = "I",** for Advanced use **char = "A"**

- If the age is less than 18:
  - If the fitness level is "Beginner", print "Eligible for Youth Program".
  - Else, print "Not Eligible".
- If the age is between 18 and 35:
  - If the fitness level is "Intermediate" or "Advanced", print "Eligible for Adult Program".
  - Else, print "Not Eligible".
- If the age is above 35:
  - If the fitness level is "Advanced", print "Eligible for Senior Program".
  - Else, print "Not Eligible".

Task 4

Write a C++ program that provides weather advisories based on temperature and humidity levels:

- If the temperature is above 30 degrees Celsius:
  - If humidity is above 70%, print "Heat Advisory: Stay Hydrated".
  - Else, print "Hot Weather: Wear Sunscreen".
- If the temperature is between 15 and 30 degrees Celsius:
  - If humidity is above 50%, print "Pleasant Weather: Enjoy Outdoors".
  - Else, print "Cool Weather: Wear a Light Jacket".
- If the temperature is below 15 degrees Celsius, print "Cold Weather: Stay Warm".

Task 5

Write a program using for loop in which the user enters a number **X** and your program prints all the numbers from **X** to zero.

Expected Output

```
Enter a number: 5
5 4 3 2 1 0
```

Task 6

Write a C++ program which take a number from user you need to sum all even number and sum of all odd number till that number and also find which sum is Greater.

```
Enter the Number: 20
Even Numbers are: 0 2 4 6 8 10 12 14 16 18 20
Sum of even number: 110

ODD Numbers are: 0 1 3 5 7 9 11 13 15 17 19
Sum of even number: 100

The Even sum is greater than Odd Sum
```

Task 7

Write a program that display the first 20 number, their square and cube using loop in this format.

Num	Square	cube
1	1	1
2	4	8
3	9	27
4	16	64
5	25	125
.	.	.
.	.	
20	400	8000

Task 8

Write a C++ program in which the user enters two numbers **X** and **Y** and your program prints all the numbers that are divisible by 3 or 5 between **X** and **Y**.

Expected Output

Example 1 Enter 1st number: 3 Enter 2nd number: 14 Number divisible by 3 or 5 are: 3 Number divisible by 3 or 5 are: 5 Number divisible by 3 or 5 are: 6 Number divisible by 3 or 5 are: 9 Number divisible by 3 or 5 are: 10 Number divisible by 3 or 5 are: 12
Example 2 Enter 1st number:11 Enter 2nd number:2 Number divisible by 3 or 5 are: 3 Number divisible by 3 or 5 are: 5 Number divisible by 3 or 5 are: 6 Number divisible by 3 or 5 are: 9 Number divisible by 3 or 5 are: 10

Task 9

Write a C++ program the user enters a number and You have to find every number factorial

N! = 1 * 2 * 3 * 5 * 6 * 7 * 8 *... * N

[Keep in mind that you cannot calculate factorial for very large numbers easily]

Expected Output:

Example Enter number: 8 **Output should be** Factorial for number 8 is 40320

Task 10

Write a C++ program that calculates the sum of squares of the first (n) natural numbers using a for loop and also calculates their average**.**

```
Enter a positive integer n: 4
Sum of squares: 30
Average of squares: 7.5
```

Task 11

Write a C++ program that takes a positive integer as input and uses a for loop to calculate the sum of its digits. For example, if the input is 1234, the output should be 10.

```
Enter an integer n: 1234
Sum is: 10
```

Task 12

Write a C++ program that prompts the user to enter (n) floating-point numbers, calculates their average, and counts how many are above the average.

```
Enter the number of floating-point numbers: 5
Enter number 1: 10.5
Enter number 2: 20.0
Enter number 3: 15.5
Enter number 4: 25.0
Enter number 5: 30.0
Average: 20.2
Count of numbers above average: 3
```

Task 13 (BONUS QUESTION))

Write Create a program that converts a range of temperatures from Celsius to Fahrenheit.

Formula:

Fahrenheit =((Celsius*9)/5) + 32;

```
Enter starting Celsius temperature: 0
Enter ending Celsius temperature: 100
Enter increment: 10
Celsius   |   Fahrenheit
-------------------------
0         |  32
10        |  50
20        |  68
30        |  86
```

40	104
50	122
60	140
70	158
80	176
90	194
100	212